The Wayback Machine - https://web.archive.org/web/20140212125752/http://www.abs.gov.au/websitedbs/CaSHome.nsf/Home/CaSMa12.1+The+Golden+Ratio

Resources

CaSMa12.1 - The Golden Ratio

You can download this activity, the teacher solutions and the assessment rubric as a rich text file (RTF) at the bottom of the page. Download our printer friendly Prepared Samples as Excel files or access data using the Random Sampler.

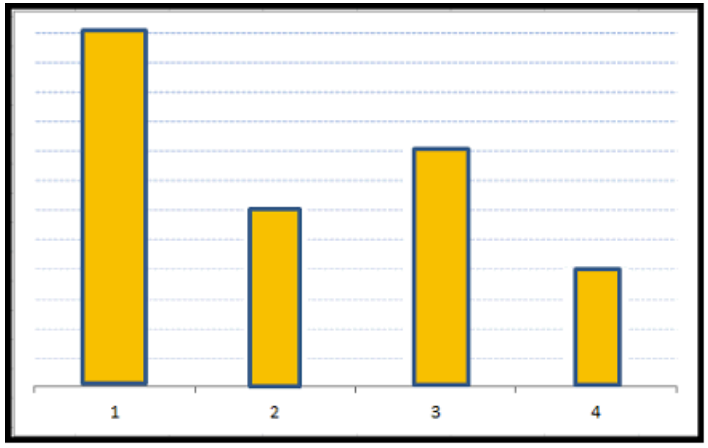
Subject Area	Mathematics
Overview	In this lesson students investigate the relationship between height and bellybutton height. It builds on ICT techniques shown in Video no. 6 in the Professional Support Materials of the C@S pages.
Requirements	• Computer with internet connection • Spreadsheet software • Calculator • Pens and paper • Student Worksheet
Instructions	**Where will I put my bellybutton?**

Background

Mae and Mikey have made some gingerbread people of different sizes. They have some icing left over and want to use it to give each a belly button. They want to place it accurately onto the body in relation to the overall height of each gingerbread person.

Task One: Your estimation

1. Imagine each of the rectangles below is a person's height. Help Mae and Mikey by showing with a cross the height of the belly button for each of the four shapes below:



2. Compared to the height, how would you describe the bellybutton height? How do you know?

3. Does this change as a person's height changes or does it stay the same? Explain.

4. If half is 0.5, estimate the decimal that is the closest to the belly button height you have shown compared to the height?

5. And in reverse, how many times greater is a person's height than their bellybutton height?

6. Use the grid lines to find the bellybutton height of each shape.

SHAPE	Height	Bellybutton Height	Decimal (H ÷ BB Height)
1	6		
2	3		
3	4		

4	2		

7. In the 4th column under the heading "Decimal (H ÷ BB Height)", calculate how many times greater the height is than the bellybutton height for each of the shapes.

8. In the space below, calculate the mean of your decimals to find your estimate of the height of the belly button compared to a person's height. Show all your working.

Task Two: The video

To complete this investigation you are going to use real data to find the height of a person's bellybutton compared to their height.

9. Watch the video titled 'Using CensusAtSchool in the Classroom' from the ‘ABS Video Tutorials’ page or follow the link below.
NB. We are interested in the second presenter. http://www.abs.gov.au/websitedbs/CaSHome.nsf/Home/Professional+Development+Videos+Entry+Page#excel

In this video Ian Wong, the presenter, asks whether the relationship between bellybutton height and height conforms to the Golden Ratio. Ian then uses features of Excel to help him organise the data to investigate whether it is true or not. He starts by asking: “Can you estimate a person’s height from their bellybutton height?” and,“The first step is to establish if a relationship exists between height and bellybutton height. If a relationship does exist we can estimate a person’s height if we know their bellybutton height.”

For this activity you will complete a similar investigation using data from the CensusAtSchool questionnaire.

Note: the version of Excel used is Excel 2003. The functions in the version of Excel you use may be in different locations but you will still be able to perform the same operations. The locations of the features used are shown below in the HELP section.

Task Three: Real data investigation

10. Download your own data sample using the CensusAtSchool random sampler. You will need to make decisions about the sample size, year level and sex of the student in your sample. You may even want to compare two different samples in your investigation.

11. Copy and paste Height and Bellybutton data into a new Excel worksheet. If you want to compare boys with girls or different year levels you will need to copy sex or year level as well.

12. Using the techniques outlined in Video no. 6 see if you agree that the height is approximately 1.6 times the bellybutton height.

13. Write a report clearly stating the steps you followed. Include any reasons for decisions you made. Include a conclusion, a copy of your data and any calculations.

14. In your report, list the Excel functions you used to complete this investigation. Put an asterisk next to the ones you used for the first time.

Excel 2010 help

The version of Excel used in the video is Excel 2003. If you are using Excel 2010, the same features can be found by using the following:

To delete a row of data: select data then Home>Cells>Delete>Delete Sheet Rows

To find the mean ratio: calculate height/bellybutton ratio in column C, then choose a display cell and type =average (C2: C last cell) *or* Home>Editing>∑> Average

Conditional formatting: go to Home>Styles>Conditional Formatting>Highlight Cell Rules>Between

Downloads

Student Worksheet	RTF
Teacher Solutions	RTF
Assessment Rubric	RTF

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